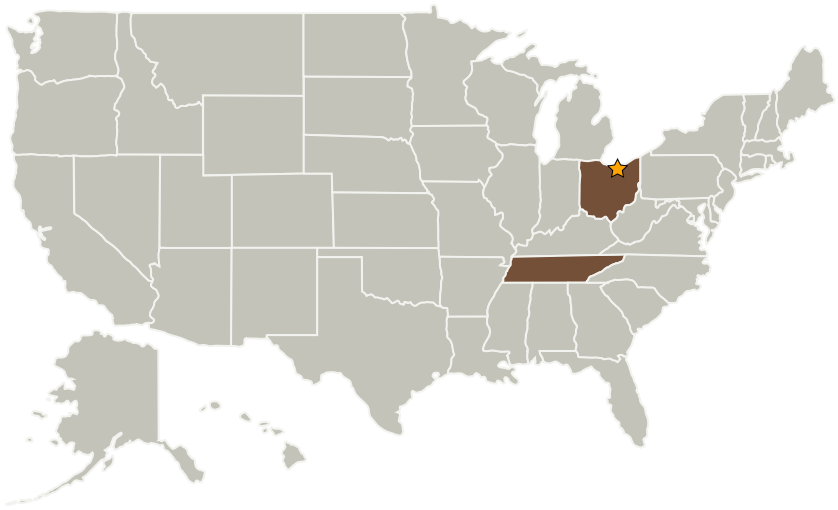
Scramjet Combustion Stability Behavior Modeling, Phase II

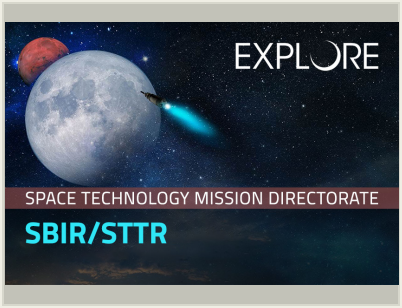
Completed Technology Project (2009 - 2011)

Project Introduction

A recent breakthrough in combustion stability analysis (UCDS) offers the potential to predict the combustion stability of a scramjet. This capability is very important due to the extreme scramjet operational environment, which makes cut-and-try development approaches impractical. With UCDS, it will be possible to accurately predict the scramjet pressure oscillation amplitudes, along with critical parameters, including the unsteady wall heat flux. The UCDS tools were recently applied to the Ares I thrust oscillation issue in support of NASA's Thrust Oscillation Focus Team (TOFT). After validating the UCDS capabilities by analyzing the RSRM, GTL applied the tool to identify a relatively minor motor modification that should eliminate the organized motor oscillations. Building upon this validation, GTL took the first step towards extending UCDS to scramjets in the Phase I effort. While a variety of issues and challenges were uncovered during the effort, the effort confirmed that the UCDS framework is fully applicable to scramjets. However, the effort also revealed that the DCR scramjet is far more complicated and difficult to analyze than a typical rockets. In the Phase II effort, GTL proposes to address the key issues that were identified during the Phase I effort.

Primary U.S. Work Locations and Key Partners





Scramjet Combustion Stability Behavior Modeling, Phase II

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

Scramjet Combustion Stability Behavior Modeling, Phase II

Completed Technology Project (2009 - 2011)

Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Gloyer-Taylor Laboratories LLC	Supporting Organization	Industry	Tullahoma, Tennessee

Primary U.S. Work Locations	
Ohio	Tennessee

Project Transitions

December 2009: Project Start

December 2011: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves